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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/079,135	02/20/2002	Jing-Jong Pan	020858-000300	7016

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EXAMINER

SONG, SARAH U

ART UNIT PAPER NUMBER

2874

DATE MAILED: 02/09/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/079,135	PAN, JING-JONG	
	Examiner	Art Unit	
	Sarah Song	2874	AW

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 February 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

1. Applicant's communication filed on November 10, 2003 has been carefully considered and placed of record in the file. Regarding claims 1-12, the arguments advanced therein, considered together with the amendment made to the claims for reciting, "a plurality of dielectric coatings directly on an endsurface of said...optical fiber segment" (line 11) is persuasive and the rejections based upon prior art made of record in the previous Office Action are withdrawn. Claims 1-20 are pending. The newly submitted abstract is approved.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 1 and 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emkey et al. (U.S. Patent 4,701,011 previously relied upon) in view of Thual et al. (U.S. Patent 6,014,483 previously relied upon) and Stone (U.S. Patent 5,037,180 newly cited).**

Emkey et al. discloses a miniature fiber optic device comprising a first optical fiber 12_i; a multimode optical fiber segment 16_i attached to an end of said first optical fiber, said first multimode optical fiber segment having a graded index of refraction and axially aligned with said first optical fiber, said multimode optical fiber segment 16_i having a length; a second optical fiber 12₀; a multimode optical fiber segment 16₀ attached to an end of said second optical fiber, said third multimode optical fiber segment 16₀ having a step index of refraction or a graded index of refraction and axially aligned with said second optical fiber, said multimode optical

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fiber segment 16₀ having a length; and an optical component element 30; said first optical fiber 12₁, said multimode optical fiber segment 16₁, said element 30, said second optical fiber 12₀, and multimode optical fiber segment 16₀ arranged and oriented with each other so light from said core of said first optical fiber passing through the element enters said core of said second optical fiber.

4. Emkey et al. does not disclose a multimode optical fiber segment having a step index of refraction attached between the optical fibers and the multimode segments having the graded index of refraction. Emkey et al. also does not specifically disclose a plurality of dielectric coatings on an end of an optical fiber segment for forming a wavelength dependent optical filter.

5. Thual et al. discloses an optical coupler comprising a multimode optical fiber segment having a step index of refraction and a length attached between the optical fibers and the multimode segments having the graded index of refraction. The multimode fiber segments having the step index of refraction in combination with the multimode fiber segments having the graded index of refraction define a collimation and focusing function for light from and to the optical fibers. The fiber collimator of Thual et al. achieves a larger mode diameter compared to other miniature fiber collimators. It would have been obvious to modify the disclosure of Emkey et al. to incorporate the step-index multimode fiber segments in between the optical fibers and the graded-index multimode fiber segments of Emkey et al. to increase the mode diameter and improve coupling efficiency of the coupler as taught by Thual et al. (see column 4, lines 55-56; column 5, lines 21-29).

6. Stone discloses a wavelength filter comprising a plurality of dielectric coatings 14 and 16 deposited directly on an endsurface of an optical fiber segment 10 for forming a wavelength-

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dependent optical filter. It would have been obvious to provide a plurality of dielectric coatings of Stone on the end of the multimode fiber segment in place of element 30 of Emkey et al. to provide a wavelength filter having improved coupling efficiency and reduced size.

7. Regarding claims 8-10, Stone discloses short-pass filters, long-pass filters, and bandpass filters (column 2, lines 1-5). Stone does not explicitly disclose a low-pass filter or a high-pass filter. It would have been obvious to one having ordinary skill in the art to form a low-pass filter or a high-pass filter since the various filters were known in the art to have specific filtering properties.

8. Regarding claims 11 and 12, Stone additionally discloses angled end faces and reciprocally angled end faces 46 and 50 for opposed components. It would have been obvious to provide the second multimode optical fiber segment and the fourth multimode optical fiber segment with reciprocally angled end faces since it was known in the art that angled end faces reduce reflection and insertion loss at coupling end faces.

9. **Claims 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emkey et al. in view of Thual et al. and Wu (U.S. Patent 6,280,099 previously relied upon).** Emkey et al. discloses a miniature fiber optic device comprising a first optical fiber 12_i; a multimode optical fiber segment 16_i attached to an end of said first optical fiber, said first multimode optical fiber segment having a graded index of refraction and axially aligned with said first optical fiber, said multimode optical fiber segment 16_i having a length; a second optical fiber 12_o; a multimode optical fiber segment 16_o attached to an end of said second optical fiber, said third multimode optical fiber segment 16_o having a step index of refraction or a graded index of refraction and axially aligned with said second optical fiber, said multimode optical fiber

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segment 16₀ having a length; and an optical component element 30; said first optical fiber 12₁, said multimode optical fiber segment 16₁, said element 30, said second optical fiber 12₀, and multimode optical fiber segment 16₀ arranged and oriented with each other so light from said core of said first optical fiber passing through the element enters said core of said second optical fiber.

10. Emkey et al. does not disclose a multimode optical fiber segment having a step index of refraction attached between the optical fibers and the multimode segments having the graded index of refraction. Emkey et al. also does not specifically disclose a plurality of dielectric coatings on an end of an optical fiber segment for forming a wavelength dependent optical filter.

11. Thual et al. discloses an optical coupler comprising a multimode optical fiber segment having a step index of refraction and a length attached between the optical fibers and the multimode segments having the graded index of refraction. The multimode fiber segments having the step index of refraction in combination with the multimode fiber segments having the graded index of refraction define a collimation and focusing function for light from and to the optical fibers. The fiber collimator of Thual et al. achieves a larger mode diameter compared to other miniature fiber collimators. It would have been obvious to modify the disclosure of Emkey et al. to incorporate the step-index multimode fiber segments in between the optical fibers and the graded-index multimode fiber segments of Emkey et al. to increase the mode diameter and improve coupling efficiency of the coupler as taught by Thual et al. (see column 4, lines 55-56; column 5, lines 21-29).

12. Wu discloses a wavelength filter comprising a plurality of dielectric coatings 9 deposited on an end of an optical fiber segment for forming a wavelength-dependent optical filter. It

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would have been obvious to provide a plurality of dielectric coatings of Wu on the end of the multimode fiber segment in place of element 30 of Emkey et al. to provide a wavelength filter having improved coupling efficiency and reduced size.

13. The method of claim 13 would have been obvious as setting forth requisite steps for providing the device as disclosed.

14. Regarding claims 14, the method would have been obvious as setting forth a requisite step for providing the angled end faces disclosed by Wu.

15. Regarding claims 15 and 16, the step of simultaneously polishing end surface of a plurality of segments (e.g. 300 segments) in a fixture having an angle-polishing guide surface is not specifically disclosed. Fixtures having angle-polishing guides are known in the art for reproducibly providing an angled end face and would have been obvious to one having ordinary skill in the art. Furthermore, it would have been obvious to polish at least 300 fiber segments simultaneously since it was known that manufacturing in bulk reduces production costs and time.

16. Regarding claims 17 and 18, the claimed lengths are not explicitly disclosed. It would have been obvious to one having ordinary skill in the art to select any desired length for the multimode fiber segments since it was known that the lensing characteristics were dependent on the length of the segments.

17. **Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emkey et al. in view of Thual et al. and ^{Stone} Wu as applied to claim 1¹, and further in view of Ravetti (U.S. Patent 5,134,470 previously relied upon).** Neither Emkey et al., Thual et al., nor Stone specifically disclose a cylindrical package holding an end section of said first optical fiber, said first multimode optical fiber segment, said second multimode optical fiber segment, an end

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section of said second optical fiber, said third multimode optical fiber segment, said fourth multimode optical fiber segment, said cylindrical package having an outside diameter less than 0.4mm. Neither Emkey et al., Thual et al., nor Stone specifically disclose metal-coated optical fibers.

18. Ravetti discloses an optical fiber interconnection comprising metal coated optical fibers and a cylindrical metal-coated glass capillary (i.e. metal sleeve) engaging portions of the end sections of optical fibers having a metal coating thereon (column 6, lines 6-13). Ravetti discloses a compact, low-profile package. It would have been obvious to one having ordinary skill in the art to provide the compact low-profile package of Ravetti to provide additional stability and ruggedness to the device without significantly increasing the size of the device. It is additionally noted that a fully metal sleeve would have been substantially equivalent to the metal-coated glass capillary and thus would have been obvious to one having ordinary skill in the art. Ravetti further discloses the diameter of the sleeve to be 125 μm (see Example).

19. Regarding claim 4, it is noted that the package has circular cross-section.

20. Regarding claims 5-7, it is noted that each metal coating is fixed to the metal sleeve by metal solder. Laser solder and laser welding are not specifically disclosed. It would have been within the level of ordinary skill in the art to use any well-known means to secure the metal-coated fibers to the metal sleeve since applicant has not demonstrated any criticality for the particular means of affixing the fibers to the package.

21. **Claims 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Emkey et al. in view of Thual et al. and Wu as applied to claim 13, and further in view of Ravetti (U.S. Patent 5,134,470 previously relied upon).** Neither Emkey et al., Thual et al., nor

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Wu specifically disclose a cylindrical package holding an end section of said first optical fiber, said first multimode optical fiber segment, said second multimode optical fiber segment, an end section of said second optical fiber, said third multimode optical fiber segment, said fourth multimode optical fiber segment, said cylindrical package having an outside diameter less than 0.4mm. Neither Emkey et al., Thual et al., nor Wu specifically disclose metal-coated optical fibers.

22. Ravetti discloses an optical fiber interconnection comprising metal coated optical fibers and a cylindrical metal-coated glass capillary (i.e. metal sleeve) engaging portions of the end sections of optical fibers having a metal coating thereon (column 6, lines 6-13). Ravetti discloses a compact, low-profile package. It would have been obvious to one having ordinary skill in the art to provide the compact low-profile package of Ravetti to provide additional stability and ruggedness to the device without significantly increasing the size of the device. It is additionally noted that a fully metal sleeve would have been substantially equivalent to the metal-coated glass capillary and thus would have been obvious to one having ordinary skill in the art. Ravetti further discloses the diameter of the sleeve to be 125 μm (see Example).

23. The method of claims 19 and 20 would have been obvious as setting forth requisite steps for providing the device as discussed above.

Response to Arguments

24. Applicant's arguments filed on November 10, 2003 with respect to claims 1-12 have been considered but are moot in view of the new ground(s) of rejection.

25. Applicant's arguments filed on November 10, 2003 with respect to claims 13-20 have been fully considered but they are not persuasive.

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26. Applicant states that there is no such teaching in Wu to provide a wavelength filter having improved coupling efficiency and a reduced size. Wu discloses the wavelength filter having improved optical properties (see abstract). Emkey discloses a device configuration having reduced size (see column 2, lines 25-29). Therefore, the prior art in combination is relied upon.

27. Applicant additionally states that claim 13 distinguishes over the prior art since Wu discloses a thin film filter (having a substrate) that is mounted with epoxy to a fiber. Examiner respectfully disagrees. Although the dielectric layers are placed on the fiber end of Wu via an intervening substrate layer and an epoxy layer, the dielectric layers are nonetheless deposited upon an end surface of the fiber. Therefore, the combination of the prior art reads on the claim as indicated in the rejection set forth above.

28. Furthermore, Applicant states that the metal sleeve of Ravetti seriously impedes the action of curing the epoxy of Wu. Examiner respectfully disagrees. The action of curing the epoxy of Wu is performed while the fibers are mounted in v-groove support member 13. In fact, Wu does disclose a protective stainless pipe or sleeve, which is provided after the filter has been secured to the fiber endface. Therefore, the metal sleeve disclosed by Ravetti does not inhibit the action of the ultraviolet rays of Wu since the epoxy is cured while the fibers are mounted on a v-groove support member and prior to the fibers being encased in the protective sleeve. Therefore, the metal sleeve of Ravetti would not seriously impede the action of the ultraviolet rays. The rejection is deemed proper.

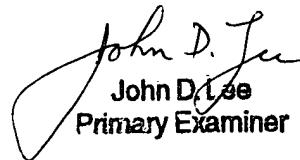
Conclusion

29. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

30. Any inquiry concerning the merits of this communication should be directed to Examiner Sarah Song at telephone number 571-272-2359. Any inquiry of a general or clerical nature, or relating to the status of this application or proceeding should be directed to the receptionist at telephone number 571-272-1562 or to the technical support staff supervisor at telephone number 571-272-1615.


sus


John D. Lee
Primary Examiner